IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the present patent application. Where claims have been amended and/or canceled, such amendments and/or cancellations are done without prejudice and/or waiver and/or disclaimer to the claimed and/or disclosed subject matter, and the applicant and/or assignee reserves the right to claim this subject matter and/or other disclosed subject matter in a continuing application.

1. (Currently Amended) A light source apparatus, comprising:

at least a first reflecting device having first and second focal points;

at least a first arc lamp having a first arc located at about the first focal point of the first reflecting device, the first arc lamp capable of producing first light rays;

a compound parabolic concentrator ~~(CPC)~~ having input and output ends, the input end located at ~~about~~ approximately the second focal point of the first reflecting device to receive the first light rays at the input end over a first range of acceptance angles and to emit the first light rays from the output end with a second range of exit angles, the second range being smaller than the first range, wherein the first light rays exit the compound parabolic concentrator with an étendue less than about 7 $mm^2 \cdot sr$; and

an optical integrator having an input aperture positioned to receive the first light rays from the output end of the compound parabolic concentrator ~~CPC~~, and an output aperture from which the first light rays are capable of exiting with a substantially uniform brightness.

2. (Currently Amended) The apparatus of claim 1, further including a first substantially spherical reflector positioned approximately adjacent to the first arc lamp to receive a portion of the first light rays and reflect them back through the first arc.

BEST AVAILABLE COPY

3. (Currently Amended) The apparatus of claim 2, ~~in which~~ wherein the first substantially spherically reflector includes a mirror coating applied to at least a portion of the first arc lamp.

4. (Currently Amended) The apparatus of claim 1, ~~in which~~ wherein the first reflecting device ~~includes~~ comprises a device ~~-a~~ selected ~~one~~ from a group comprising ~~of~~ a free-form reflector, a double-ellipsoid reflector, and/or a double-paraboloid reflector.

5. Cancelled

6. (Currently Amended) The apparatus of claim 1, ~~in which~~ wherein the optical integrator comprises a glass rod integrator.

7. (Currently Amended) The apparatus of claim 6, ~~in which~~ wherein the glass rod integrator is tapered such that the cross-sectional area of the input end is less than the cross sectional area of the output end.

8. (Currently Amended) The apparatus of claim 1, further comprising:

a second reflecting device having first and second focal points, the second reflecting device positioned such that the second focal points of the first and second reflecting devices are substantially coincident;

a second arc lamp having a second arc located at ~~about~~ approximately the first focal point of the second reflecting device, the second arc lamp capable of producing second light rays, the compound parabolic concentrator ~~CPC~~ capable of receiving ~~to receive~~ the second light rays at the input end over a third range of acceptance angles and capable of emitting ~~emits~~ the second light rays from the output end with a fourth range of exit angles, the fourth range being smaller than the third range; and

the optical integrator input aperture positioned to receive the second light rays from the output end of the compound parabolic concentrator ~~CPC~~, and ~~emit~~ capable of emitting the second light rays from the output aperture with a substantially uniform brightness.

9. (Currently Amended) The apparatus of claim 8, ~~in which~~ wherein the first and second reflecting devices ~~include a~~ comprises a device selected ~~one~~ selected from a group comprising ~~of~~ a free-form reflector, a double-ellipsoid reflector, and/or a double-paraboloid reflector.

10. (Currently Amended) The apparatus of claim 8, ~~in which~~ wherein the first and second reflectors are relatively positioned such that a pair of lines extending from the coincident second focal points to the first focal points form ~~about~~ approximately a 90° angle.

11. (Currently Amended) The apparatus of claim 8, ~~in which~~ wherein the light rays enter the compound parabolic concentrator ~~CPC~~ with ray angles of up to about 90° and exit the compound parabolic concentrator ~~CPC~~ with ray angles of about 30° or less.

12. (Currently Amended) The apparatus of claim 8, ~~in which~~ wherein the ratio of the integrator input area to the compound parabolic concentrator ~~CPC~~ output area is ~~about~~ approximately 5:1.

13. (Currently Amended) The apparatus of claim 8, ~~in which~~ wherein the optical integrator comprises a glass rod integrator.

14. (Currently Amended) The apparatus of claim 13, ~~in which~~ wherein the glass rod integrator is tapered such that the cross-sectional area of the input end is less than the cross sectional area of the output end.

15. (Withdrawn)

16. (Currently Amended) A projection system, comprising:

an illumination system comprising

at least a first reflecting device having first and second focal points;

at least a first arc lamp having a first arc located at about the first focal point of the first reflecting device, the first arc lamp capable of producing first light rays;

a compound parabolic concentrator ~~(CPC)~~ having input and output ends, the input end located at ~~about~~ approximately the second focal point of the first reflecting device to receive the first light rays at the input end over a first range of acceptance angles and to emit the first light rays from the output end with a second range of exit angles, the second range being smaller than the first range wherein the first light rays exit the compound parabolic concentrator with an étendue less than about 7 mm^2•sr; and

an optical integrator having an input aperture positioned to receive the first light rays from the output end of the compound parabolic concentrator ~~CPC~~, and an output aperture from which the first light rays exit with a substantially uniform brightness;

a light valve optical arrangement optically coupled to the illumination system; and

a projection lens optically coupled to the light valve optical arrangement.

17. (Currently Amended) The projection system of claim 16, ~~in which~~ wherein the

light valve optical arrangement comprises liquid crystal on silicon ~~(LCOS)~~ light valves.

18. (Currently Amended) The projection system of claim 16, ~~in which~~ wherein the light valve optical arrangement comprises a frame sequential color projection display and wherein the illumination system further includes a color wheel positioned approximately adjacent to the optical integrator.

19. (Currently Amended) The projection system of claim 16, ~~in which~~ wherein the aspect ratio of the output aperture substantially matches the aspect ratio of a light valve in the light valve arrangement.

20. (Currently Amended) The projection system of claim 16, ~~in which~~ wherein the illumination system further comprises

a second reflecting device having first and second focal points, the second reflecting device positioned such that the second focal points of the first and second reflecting devices are substantially coincident;

a second arc lamp having a second arc located at ~~about~~ approximately the first focal point of the second reflecting device, the second arc lamp capable of producing second light rays, the compound parabolic concentrator ~~CPC~~ input end to receive the second light rays at the input end over a third range of acceptance angles and to emit[[s]] the second light rays from the output end with a fourth range of exit angles, the fourth range being smaller than the third range; and

the optical integrator input aperture positioned to receive the second light rays from the output end of the compound parabolic concentrator ~~CPC~~, and to emit the second light rays from the output aperture with substantially uniform brightness.

21. (Currently Amended) A projection system, comprising:

an illumination system comprising first and second reflecting devices having respective first and second focal points, positioned such that the second focal points of the first and second reflecting devices are substantially coincident, the illumination system further comprising a compound parabolic concentrator having input and output ends, the input end located at approximately the coincident second focal points of the first and second reflecting devices to receive first and second light rays over a first range of acceptance angles and to emit the first and second light rays from the output end with a second range of exit angles, the second range being smaller that the first range, wherein the first light rays exit the compound parabolic concentrator with an étendue less than about 7 mm^2•sr;

first and second arc lamps associated respectively with the first and second reflecting devices ~~for~~ capable of producing respective said first and second light rays; and

each arc lamp having an arc located at about the first focal point of the corresponding reflecting device;

a light valve optical arrangement optically coupled to illumination system; and

a projection lens optically coupled to light valve optical arrangement.

22. Cancelled

23. (Currently Amended) The projection system of claim 21, ~~in which~~ wherein the light valve optical arrangement comprises a liquid crystal on silicon ~~LCOS~~ light valve.

24. (Currently Amended) The projection system of claim 21, ~~in which~~ wherein the light valve optical arrangement comprises a frame sequential color projection display and the

illumination system further includes a color wheel positioned approximately adjacent to the optical integrator.

25. (Currently Amended) A method for providing illumination, comprising:

generating light rays from at least a first arc lamp having a first arc;

reflecting said light rays with at least a first reflecting device having a first and second focal points, the first reflecting device being positioned with the first focal point substantially coincident with the first arc of the first arc lamp;

receiving said light rays, at an input end of a compound parabolic concentrator ~~(CPC)~~, over a first range of acceptance angles;

emitting said light rays, from an output end of the compound parabolic concentrator ~~CPC~~, with a second range of exit angles, the second range being smaller than the first range, wherein the light rays exit the compound parabolic concentrator with an étendue less than about 7 mm^2•sr; and

integrating said light rays with an optical integrator.

26. (Currently Amended) The method of claim 25, further ~~including~~ comprising reflecting a portion of the light rays back through the first arc with a first substantially spherical reflector adjacent to the first arc lamp.

27. (Currently Amended) The method of claim 25, ~~in which~~ wherein said reflecting with at least a first reflecting device comprises reflecting the light rays with a reflector selected from a group ~~consisting of~~ comprising a free-form reflector, a double-ellipsoid reflector, and/or a double-paraboloid reflector.

28. (Currently Amended) The method of claim 25, further comprising:

positioning a second reflecting device having first and second focal points, such that the second focal points of the first and second reflecting devices are substantially coincident;

generating second light rays from a second arc lamp having a second arc located at ~~about~~ approximately a first focal point of a second reflecting device;

reflecting the second light rays with the second reflecting device~~,~~ towards a second focal point of the second reflecting device;

receiving the second light rays at the input end of the compound parabolic concentrator ~~CPC~~ over a third range of acceptance angles; and

emitting the second light rays from the output end of the compound parabolic concentrator ~~CPC~~ with a fourth range of exit angles, the fourth range being smaller that the third range.

29. (Currently Amended) The method of claim 28, ~~in which~~ wherein said reflecting with first and second reflecting devices comprises reflecting the light rays with reflectors selected from a group ~~consisting of~~ comprising a free-form reflector, a double-ellipsoid reflector, and/or a double-paraboloid reflector.

30. (Currently Amended) A light source apparatus, comprising:

first and second reflecting devices having respective first and second focal points, positioned such that the second focal points are substantially coincident; ~~and~~

first and second arc lamps associated respectively with the first and second reflecting devices capable of ~~for~~ producing respective first and second light rays, each arc lamp having an arc located at ~~about~~ approximately the first focal point of the respective first and second reflecting devices; and

a compound parabolic concentrator having input and output ends, the input end located at approximately the second focal point of the first and second reflecting devices to receive the first and second light rays over a first range of acceptance angles and to emit the first and second light rays from the output end with a second range of exit angles, the second range being smaller that the first range, wherein the first and second light rays exit the compound parabolic concentrator with an étendue less than about 7 mm^2•sr.

31. Cancelled

32. Cancelled

33. (Currently Amended) The apparatus of claim 30 ~~31~~, ~~in which~~ wherein the light rays enter the compound parabolic concentrator ~~CPC~~ with ray angles of up to about 90° and exit the compound parabolic concentrator ~~CPC~~ with ray angles of about 30° or less.

34. (Currently Amended) The apparatus of claim 30, further including first and second substantially spherical reflectors, positioned adjacent to respective arc lamps ~~, to receive~~ and capable of receiving a portion of the respective light rays and reflecting them back through the respective arcs.

35. (Currently Amended) The apparatus of claim 34, ~~in which~~ wherein the first and second substantially spherical reflectors include a mirror coating applied to a portion of the arc

[redacted]

lamps.

36. (Currently Amended) The apparatus of claim 30, ~~in which~~ wherein the first and second reflecting devices include reflectors selected from the group ~~consisting of~~ comprising a free-form reflector, a double-ellipsoid reflector, and/or a double-paraboloid reflector.

37. (Currently Amended) A method for providing illumination, comprising:

generating first and second light rays from first and second arc lamps, the first arc lamp positioned on or about a first focal point of a first reflecting device and the second arc lamp positioned on or about a first focal point of a second reflecting device;

reflecting the first light rays toward a second focal point of the first reflecting device; ~~and~~

reflecting the second light rays toward a second focal point of the second reflecting device, which is substantially coincident with the second focal point of the first reflecting device;

receiving said first and second light rays at an input end of a compound parabolic concentrator over a first range of acceptance angles; and

emitting said first and second light rays from an output end of the compound parabolic concentrator with a second range of exit angles, the second range being smaller than the first range, wherein the first light rays exit the compound parabolic concentrator with an étendue less than about 7 $mm^2 \cdot sr$.

38. Cancelled

39. (Currently Amended) A system comprising:

a video unit ~~with~~ capable of producing an output video signal; and

a projection system, coupled to video unit, ~~to receive~~ capable of receiving the video output signal and further capable of projecting video, said projection system comprising

an illumination system comprising first and second reflecting devices having respective first and second focal points, positioned such that the second focal points are substantially coincident, first and second arc lamps associated respectively with reflecting devices for producing respective first and second light rays, each arc lamp having an arc located at about the first focal point of the corresponding reflecting device, the illumination system further comprising a compound parabolic concentrator having input and output ends, the input end located at about the second focal point of the reflecting devices, said input end receiving light rays over a first range of acceptance angles and emitting light rays from the output end with a second range of angles, the second range being smaller than the first range, wherein the first light rays exit the compound parabolic concentrator with an étendue less than about 7 $mm^2 \cdot sr$;

a light valve optical arrangement optically coupled to the illumination system; and

a projection lens optically coupled to the light valve optical arrangement.

40. (Currently Amended) The system of claim 39, ~~in which~~ wherein the video unit is selected from the group ~~consisting of~~ comprising a digital versatile disk ~~(DVD)~~ player, video camera, and/or set-top box.

41. (Currently Amended) The system of claim 39, in which illumination system further comprises ~~a compound parabolic concentrator (CPC) having input and output ends, the input end located at about the second focal point of the reflecting devices, said input end receiving~~

~~light rays over a first range of acceptance angles and emitting light rays from the output end with a second range of angles, the second range being smaller than the first range; and~~

an optical integrator having an input aperture positioned to receive the light rays from the output end of the compound parabolic concentrator ~~CPC~~, and an output aperture from which the light rays exit with a substantially uniform brightness.

42. (Currently Amended). The system of claim 39, ~~in which~~ wherein the light valve optical arrangement comprises a liquid crystal on silicon ~~LCOS~~ light valve.

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☑ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: ______________________

IMAGES ARE BEST AVAILABLE COPY.
As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.